maxima, five months (February and July to October) of moderate, and four (March to June) of high maxima. The months of high absolute humidity, July and August, are unfavorable to great intensity of insolation. The maxima of intensity are higher not only in the spring months, but also in September, and the absolute maximum of October is equal to that of July, but how different are the conditions of the lower atmosphere! In October the temperature is —6.7° C. and absolute humidity 2.2 mm.; in July the temperature is 21.3° C. and absolute humidity 10.6 mm.

During ten months out of twelve the absolute maxima were observed in the forenoon, a fact observed also elsewhere, apparently due to the fact that in the morning there is less aqueous vapor and generally also less dust or haze than in the afternoon.

At the end of this memoir the author gives in detail, for both stations, all the corresponding observations of radiation, cloud, and wind. The maximum radiation of each month, shown in the author's tables in bold-face type, is given in the accompanying Table 7, in plain figures, in column under head of "Maximum."

THE STUDY OF EVAPORATION.

By Prof. A. VOEIKOV. Dated St. Petersburg, December, 1907.

I was much interested in Professor Bigelow's paper "on the Salton Sea and evaporation."[1] Such another occasion is not to be expected soon, and the study intrusted to a man of the knowledge and ability of Professor Bigelow will be of immense benefit to science.

My present remarks apply to the comparison of the different formulas for evaporation in which the velocity of the wind is introduced. Professor Bigelow, by introducing the same values of temperature, humidity, and wind, finds that the results vary more than in the relation of 2:1 (Stelling 0.3495, Abassia 0.1337). I think the principal cause of the discrepancy between these empirical formulas is that the wind velocity was not observed at the same place where the evaporating basin or dish is situated, the anemometer being placed much higher, on the top of a building or on a tower.

The better the anemometers are placed for the needs of general meteorology—that is to say, the freer is the access of air and the less the retardation by friction, by so much the less will these wind velocities agree with those at the surface of the evaporation basin or dish. Then, if the evaporation is measured from a large tank or basin in the open air, the access of the wind will be freer than to small evaporation dishes placed, as they often are, in screens whose walls impede the access of air; but, on the other hand, the humidity of the air will be greater over the surface of a larger body of water, owing to the diffusion of the greater quantity of evaporated water.

The examples in Table 1 show a great discrepancy in the rate of evaporation, while the wind velocity, temperature, and humidity of the air are nearly the same. The evaporometer and its exposure in the screen were the same. The wind velocity is given approximately by Wild's wind vane, with heavy inclined pendulum plane.

TABLE 1.

Month.	Pinsk, 52° N., 26° W.				Vasilivichi, 52.3° N., 29.6° W.			
	Evaporation.	Temperature.	Relative humidity.	Vapor tension.	Evaporation.	Temperature.	Relative humidity.	Vapor tension.
1897.	*mm.*	°*C.*	%	*mm.*	*mm.*	°*C.*	%	*mm.*
June	71.4	18.7	63	3.5	96.6	18.3	69	2.3
July	65.2	19.9	76	3.0	94.7	20.1	73	2.8
August	65.8	19.4	73	3.1	96.5	19.0	74	3.1
September	34.5	12.9	81	2.3	52.9	12.9	80	2.3

[1] Monthly Weather Review for July, 1907.

Both places are in nearly the same latitude and distant by about 100 kilometers. At Pinsk there is a great expanse of river and marsh to the south and west. So the winds have freer access than at Vasilivichi, where forests impede them more. But at the screen where the evaporators are placed there is a rather thick growth of trees at Pinsk, while at Vasilivichi there is no growth of trees in the vicinity of the screen.

If empirical formulas were deduced from the observations at these two places, their coefficients would be different, those from the Pinsk observations would be such as to give smaller values for the same wind velocity, and those from the Vasilivichi observations greater values.

THE EVAPORATING POWER OF THE AIR AT THE NEW YORK BOTANICAL GARDEN.

By C. STUART GAGER. From the Journal of New York Botanical Garden, December, 1907.

In May, 1900, three meteorological stations were established in the garden.[1] Station 1, located in the herbaceous garden, was equipped with a standard rain gage, a thermograph, and a set of maximum and minimum thermometers. Station 2 was on a low ridge in the center of the hemlock forest, and station 3 in the central portion of the elevated plain of the fruticetum. The last two stations were equipped with thermographs only.

Late in September, 1904, these three stations were abandoned.[2] The catchment basin of the rain gage was installed on the roof of the museum building over the physiological laboratory, and, by means of a lead pipe extending down thru one of the supporting pillars, it was connected with the gage at the base of the pillar, inside the laboratory. The amount of precipitation recorded at the new station was found to be approximately the same as at the old one. The thermometers and thermographs were all transferred to a shelter house located within the experiment garden, near the propagating houses, on the eastern border of the garden.

Until June, 1907, the meteorological records at the garden include only the dates and amounts of precipitation, and the temperature of the air and that of the soil at two depths. The amount of precipitation, however, is not an index of the amount of water available to vegetation. Part of the meteoric water drains away thru the soil before it is used, while a portion of it evaporates from the surface of the soil into the air. It is the ratio between annual precipitation and evaporation that chiefly determines how nearly a given region approaches to either a swamp or a desert. In a swamp evaporation is less than precipitation, while in a desert the reverse is true.

It is a well-known fact that the rate of evaporation from a given area depends upon the relative humidity of the surrounding air. Relative humidity, in turn, varies with the temperature of the air and with the environment. Thus, for a given air temperature, the rate of evaporation from a given water surface will vary with the area of the surface and with the depth of the water, and the rate of evaporation from moist substances will be modified by the nature of the substance, and with the amount of moisture it contains. Thus, for example, water will evaporate more rapidly from one square foot of water surface than from two square feet, and more rapidly from one square foot with a depth of, say, one quarter of an inch, than it will from the same area over a depth of one foot. Also the same amount of water will evaporate at different rates from clay soil and from sand soil. Shrubbery and foliage tend in several ways to increase the relative humidity of the surrounding air, thus retarding evaporation.

The experiments described in this paper form part of a more extended investigation, inaugurated by Dr. Burton E. Livingston, of the Desert Botanical Laboratory, of the Carnegie Institution, at Tucson, Arizona. Evaporimeters of uni-

[1] Journal N. Y. Botanical Garden, vol. 1, p. 76, 1900.
[2] Journal N. Y. Botanical Garden, vol. 5, p. 211, 1904.